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(56) Documents Cited

EP 0066308 A1

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## (54) Adjustable vehicle steering column

(57) A vehicle steering column assembly in which the column is adjustable for a rake and reach includes a steering column support bracket 3 with two flanks 3A each incorporating a slot 3B to permit rake adjustment. A bracket means 8 has two flanks 8A which lie adjacent the flanks 3A of the bracket 3 and have slots 8B extending parallel to the tube axis 9A for reach adjustment. The flanks 8A are spaced from the tube 9 so as to accept heads 10A of clamping bolts 10 operated by a handle 7 acting on associated clamping parts 12 mounted on the bolts 10. The bracket means 8 comprises pressed elements welded to the steering column outer tube 9. Alternative forms of bracket means 8 are disclosed including one in which the bracket means is a one-piece casting or extrusion.

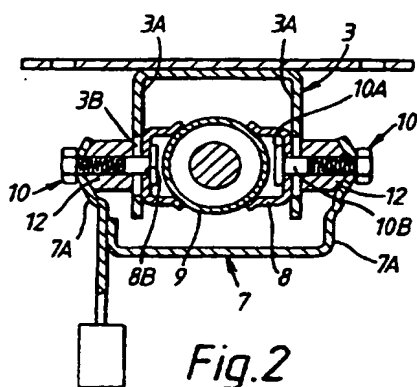


Fig.2

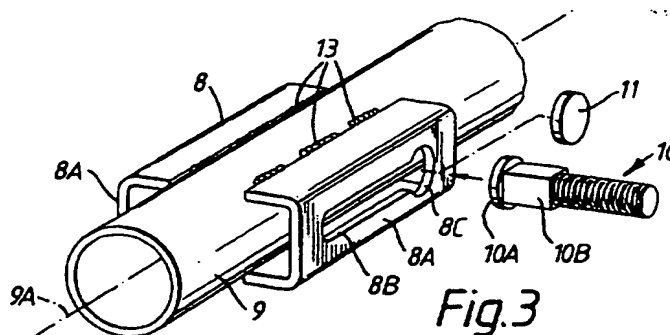


Fig.3

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At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

The claims were filed later than the filing date within the period prescribed by Rule 25(1) of the Patents Rules 1995

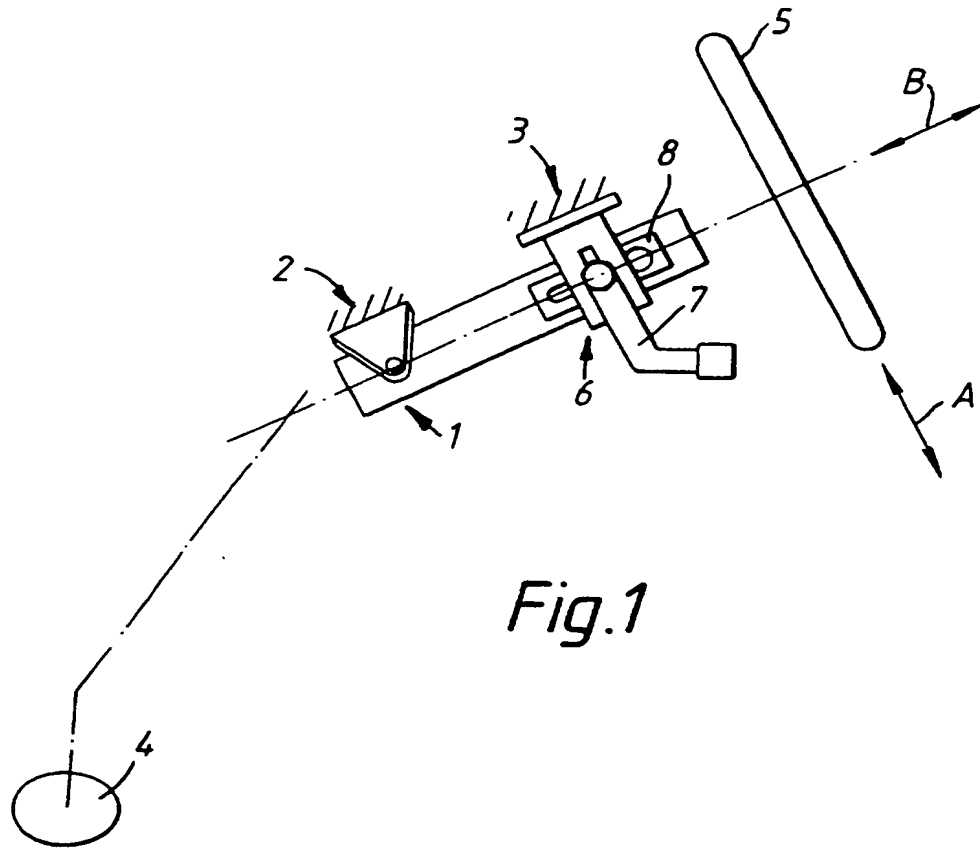


Fig.1

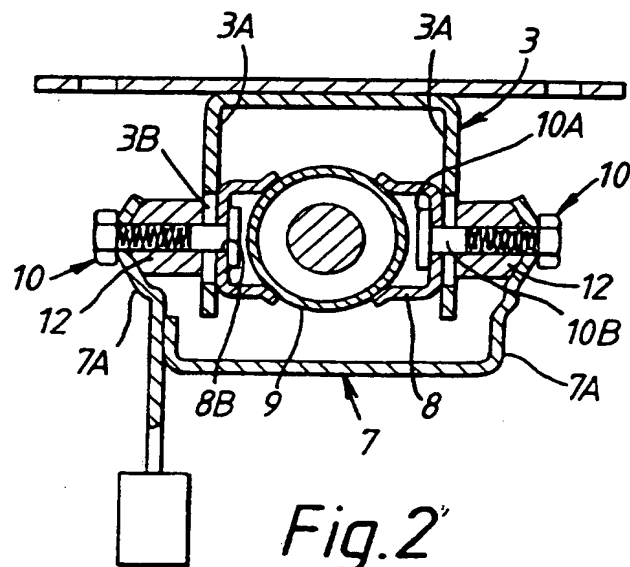
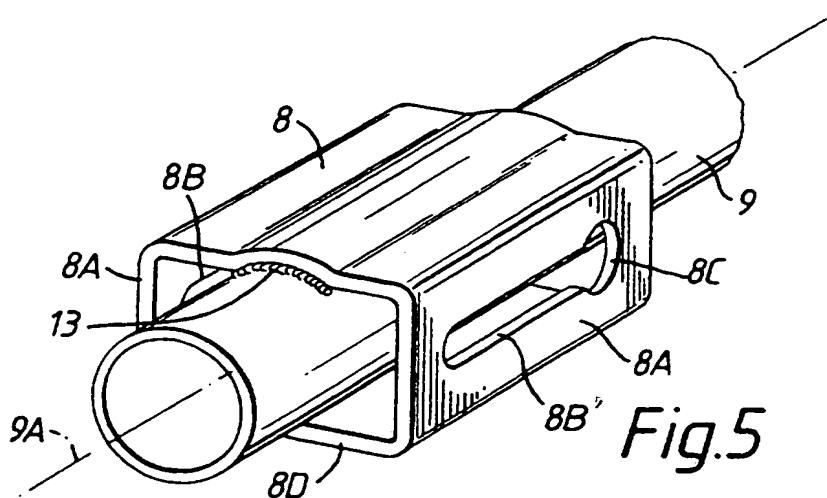
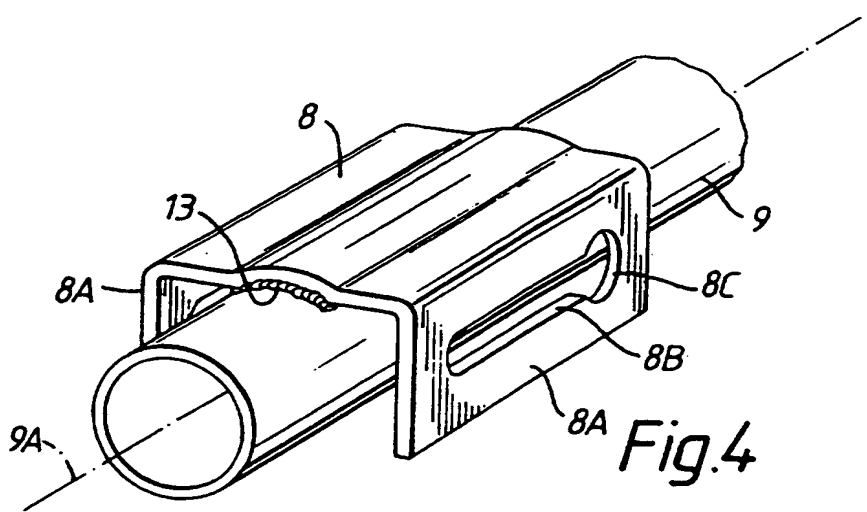
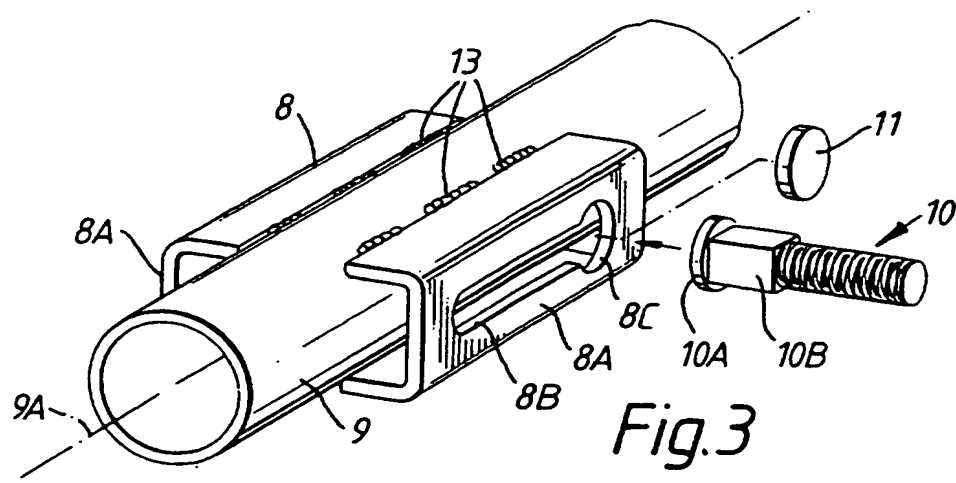
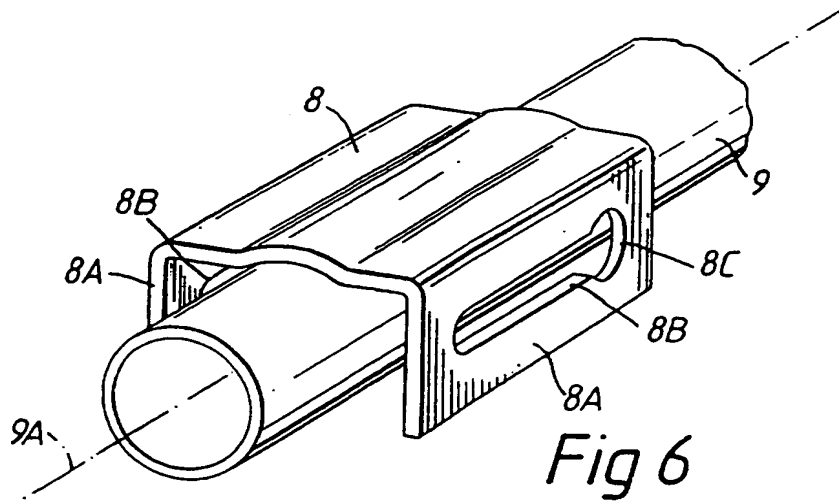


Fig.2



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ADJUSTABLE VEHICLE STEERING COLUMN CLAMPING MECHANISM

This invention relates to an adjustable vehicle steering column clamping mechanism.

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In known adjustable vehicle steering column clamping mechanisms, a steering column outer tube is supported in a bracket with slots in it to permit rake or vertical adjustment of the steering column and steering wheel and other slotted parts are provided to permit reach or axial adjustment of the steering column. In these known constructions, a clamping mechanism is provided with a clamping handle, the mechanism including a bolt rotatable by the clamping handle, the bolt extending between two flanks of the support bracket on either side of the steering column outer tube and the clamping mechanism clamp and release the steering column outer tube relative to the support bracket and the parts for reach adjustment.

It will be appreciated that for the bolt to extend between the embracing flanks of the steering column outer tube, the bolt must pass either under or over the steering column outer tube, which therefore takes up space. In addition, in certain circumstances, uneven clamping effort is obtained with such an under or over arrangement of bolt clamping mechanism, with the bolt clamping pressure acting only from one side.

According to the present invention, there is provided an adjustable vehicle steering column clamping mechanism including a steering column support bracket with two flanks for extending either side of a steering column outer tube, each flank incorporating a slot for adjustment of a

steering column in a rake direction, and a reach adjustment bracket means arranged to be joined to the steering column outer tube, the reach adjustment bracket means having two flanks for extending either side of the steering column outer tube, each flank of the reach adjustment bracket incorporating a slot for adjustment of the steering column in the reach direction; there being a clamping mechanism operating handle with parts extending to embrace the flanks on both sides of the steering column outer tube, and threaded bolts and associated clamping members on the bolts rotatable by said operating handle parts; one of the bolts extending through the slots in the flanks of the two brackets on one side of the steering column outer tube and the other bolt extending through the slots of the two brackets on the other side of the steering column outer tube; the arrangement being such that rotation of the handle in one direction moves said parts in a direction to clamp the brackets and steering column outer tube and rotation of the handle in the opposite direction moves said parts in a direction to release the brackets and steering column outer tube, thereby to facilitate adjustment of the steering column.

It will be appreciated that with such an arrangement the bolts need not cross over or under the steering column but can be located on a substantially on-centre line passing at right angles through the axis of the steering column.

In a preferred embodiment, the respective flanks of the steering column support bracket extend outside the flanks of the reach adjustment bracket means.

The innermost flanks can be spaced from the steering column outer tube so that a head of each bolt can lie between the inner side of the respective innermost flank and the outer side of the steering column outer tube.

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The slots in the flanks of the reach adjustment bracket means can be provided with a keyhole portion through which the head of a respective bolt can pass so as to be located on the inner side of the flank.

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Each bolt can be given both a left-hand and a right-hand thread. The threads can be multi-start threads.

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The reach adjustment bracket can be joined to the steering column outer tube by welding and the reach adjustment bracket means can be pressed, cast or extruded.

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For a better understanding of the invention and to show how the same may be carried into effect, reference will now be made, by way of example, to the accompanying drawings, in which:-

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Figure 1 is a schematic view showing an adjustable vehicle steering column including a clamping mechanism,

Figure 2 is a diagrammatic sectional view of the adjustable vehicle steering column clamping mechanism of Figure 1, and

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Figures 3, 4, 5 and 6 are respective views of various possible forms that a reach adjustment bracket means of the clamping mechanism can take.

Figure 1 shows an adjustable vehicle steering column 1 secured by brackets 2 and 3 and connected to a steering column rack 4. A steering wheel 5 is illustrated and the double arrow A illustrates the direction of possible vertical or rake adjustment of the steering wheel 5 and the double arrow B illustrates the direction of axial or reach adjustment thereof.

A steering column clamping mechanism 6 includes an operating clamp handle 7 with the mechanism acting on the support bracket 3, which is also provided for rake adjustment, and a reach adjustment bracket means 8.

The steering column support bracket 3 has two flanks 3A extending either side of a steering column outer tube 9, each flank 3A incorporating a slot 3B to permit rake adjustment of the steering column 1.

The reach adjustment bracket means 8 can take various forms but in each case it is provided with two flanks 8A which extend on respective sides of the steering column outer tube 9 and lie adjacent the respective flanks 3B of the support bracket 3.

In the embodiment illustrated, it is intended that the flanks 8A of the bracket means 8 lie inside the flanks 3B of the support bracket 3 and are spaced a sufficient distance from the outer surface of the steering column outer tube 9 to accommodate heads 10A of respective clamping bolts 10.

Each flank 8A of the reach adjustment bracket means 8 is provided with a slot 8B extending parallel to the axis 9A

of the steering column outer tube 1 and, in the form illustrated, these slots 8B are aligned with each other and with the axis 9A of the steering column outer tube 9. However, it is to be understood that the line of the slots 8B could be somewhat above or below the axis 9A.

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The slots 8B in the flanks 8A are each provided with a keyhole 8C to permit admission of the respective heads 10A of the two locking bolts 10, as illustrated in Figures 2 and 3. Once the heads 10A of the bolts 10 have been inserted, the keyholes 8C can be plugged by plugs such as the one in illustrated at 11 to prevent subsequent disengagement of the bolts 10.

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As intimated, the locking bolts 10 form part of the clamping mechanism and can be provided with squared rubbing surfaces as illustrated at 10B in Figure 3, these rubbing surfaces running along the edges of the slot 8B. These rubbing surfaces could be circular instead of square.

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Each bolt 10 is provided with a left-hand and a right-hand thread and the threads can be multi-start threads. Mounted on the threads are parts of the clamping mechanism operating handle 7 which extend to embrace the flanks 3A and 8A on both sides of the outer tube 9.

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It will be noted that the parts 7A of the operating handle 7 are mounted in threaded relationship on the locking bolts 10, each part 7A embracing an inner cone 12 associated with a clamping nut threaded on the bolt 10.

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Rotation of the operating handle 7 rotates the clamping nuts on the bolts 10 in opposite senses on the threads so

that the parts 7A are drawn towards one another to cause the clamping nuts to clamp the two bracket 3 and 8 together to inhibit steering column adjustment. In the opposite direction of rotation, of the operating handle 7, the parts 7A are urged in the opposite sense to unclamp the two brackets to permit adjustment.

Upon assembly of the clamping mechanism, the various components are mounted in a matched sense to obtain equal clamping effort on both sides of the steering column.

Various embodiments of reach adjustment bracket means (8) are illustrated.

In Figures 2 and 3, the reach adjustment bracket means 8 is in fact in two separate parts and can be formed by pressing, with the parts constituting the flanks 8A being spaced from the outer tube 9 and forming the bases of U-shaped parts, edges of which being welded at 13 for example to the outer tube 9.

Figure 4 shows the reach adjustment bracket means 8 in the form of a saddle bracket straddling the outer tube 9 and again the bracket 8 can be pressed and then welded to the tube 9.

Figure 5 is similar to Figure 4 but shows that the two flanks 8A can be joined at their lower edges by a lower plate 8D extending below the outer tube 9. In this case, the outer tube can be a drawn tube and again the reach adjustment bracket is welded to it.

Figure 6 illustrates an embodiment similar to Figure 4 except that the unit can be cast or extruded.

**CLAIMS:**

1. An adjustable vehicle steering column clamping mechanism including a steering column support bracket with two flanks for extending either side of a steering column outer tube, each flank incorporating a slot for adjustment of a steering column in a rake direction, and a reach adjustment bracket means arranged to be joined to the steering column outer tube, the reach adjustment bracket means having two flanks for extending either side of the steering column outer tube, each flank of the reach adjustment bracket incorporating a slot for adjustment of the steering column in the reach direction; there being a clamping mechanism operating handle with parts extending to embrace the flanks on both sides of the steering column outer tube, and threaded bolts and associated clamping members on the bolts rotatable by said operating handle parts; one of the bolts extending through the slots in the flanks of the two brackets on one side of the steering column outer tube and the other bolt extending through the slots of the two brackets on the other side of the steering column outer tube; the arrangement being such that rotation of the handle in one direction moves said parts in a direction to clamp the brackets and steering column outer tube and rotation of the handle in the opposite direction moves said parts in a direction to release the brackets and steering column outer tube, thereby to facilitate adjustment of the steering column.

2. A clamping mechanism according to claim 1, in which the respective flanks of the steering column support bracket extend outside the flanks of the reach adjustment bracket means.

3. A clamping mechanism according to claim 1 or 2, wherein the bracket means which has the innermost flanks is spaced from the steering column outer tube so that a head of each bolt can lie between the inner side of the  
5 respective innermost flank and the outer side of the steering column outer tube.

4. A clamping mechanism according to claims 1, 2 and 3, wherein the slots in the flanks of the reach adjustment  
10 bracket means is provided with a keyhole portion through which the head of a respective bolt can pass so as to be located on the inner side of the flank.

5. A clamping mechanism according to any one of the  
15 preceding claims, wherein each bolt is given both a left-hand and a right-hand thread.

6. A clamping mechanism according to claim 5, wherein the  
20 threads are multi-start threads.

7. A clamping mechanism according to any one of the  
25 preceding claims, wherein the reach adjustment bracket means is in two parts, each part being joined to the steering column outer tube.

8. A clamping mechanism according to any one of the  
preceding claims, wherein the reach adjustment bracket is joined to the steering column outer tube by welding.

9. A clamping mechanism according to any one of the  
30 preceding claims, wherein the reach adjustment bracket means is formed by pressing, casting or extrusion.

10. An adjustable vehicle steering column clamping mechanism, substantially as hereinbefore described, with reference to Figures 1, 2 and 3, with or without the modification of Figure 4, 5 or 6.

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11. An adjustable vehicle steering column incorporating a clamping mechanism according to any one of the preceding claims.

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12. A vehicle steering column according to claim 11, wherein the bolts of the clamping mechanism are located on a substantially on-centre line passing at right angles through the axis of the steering column on either side thereof, respectively.

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13. An adjustable vehicle steering column incorporating a clamping mechanism according to any one of claims 1 to 10, substantially as hereinbefore described with reference to Figures 1 to 3 with or without the modification of Figure 4, 5 or 6.

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**Patents Act 1977**  
**Examiner's report to the Comptroller under Section 17**  
**(The Search report)**

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Application number  
 GB 9518520.3

**Relevant Technical Fields**

(i) UK Cl (Ed.O) F2Y (YSQ)

(ii) Int Cl (Ed.6) B62D 1/18

Search Examiner  
 PETER SQUIRE

Date of completion of Search  
 16 JANUARY 1996

**Databases (see below)**

(i) UK Patent Office collections of GB, EP, WO and US patent specifications.

(ii) ONLINE: EDOC. WPI

Documents considered relevant following a search in respect of Claims :-  
 1-13

**Categories of documents**

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| <p><b>X:</b> Document indicating lack of novelty or of inventive step.</p> <p><b>Y:</b> Document indicating lack of inventive step if combined with one or more other documents of the same category.</p> <p><b>A:</b> Document indicating technological background and/or state of the art.</p> | <p><b>P:</b> Document published on or after the declared priority date but before the filing date of the present application.</p> <p><b>E:</b> Patent document published on or after, but with priority date earlier than, the filing date of the present application.</p> <p><b>&amp;:</b> Member of the same patent family; corresponding document.</p> |
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Category	Identity of document and relevant passages	Relevant to claim(s)
A	EP 0066308 A1 (SCHMIDT)	

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